

# Product designation

Centrifugal pump

Product series: PR... / PRG... / PRT... /  
PRA... / HCT... / PRK...

Original assembly instructions with associated  
operating instructions acc. to EC Machinery Directive  
2006/42/EC

Version 02



**Spandau  
pumpen**

## Masthead

These original assembly instructions with associated operating instructions pursuant to EC Machinery Directive 2006/42/EC are an integral part of the described product and must be kept for future use.

These assembly instructions with associated operating instructions have been prepared in accordance with the established standards and rules for technical documentation, VDI 4500 and EN 292.

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Subject to changes in contents and technical information.

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# Information concerning EC Declaration of Conformity and EC Declaration of Incorporation

The product

installation instructions, can negatively impact the EMC characteristics and electrical safety.

whose vapor pressure exceeds normal atmospheric pressure (1013 mbar) by more than 0.5 bar at their maximum permissible temperature.

## Centrifugal pump

of the series:

PR... / PRG... / PRT... / PRA... / HCT... / PRK...

is hereby confirmed to comply with the essential protection requirements stipulated by the following Directive(s) of the Council on the approximation of laws of the Member States concerning:

- **Machinery Directive 2006/42/EC**
- **Low Voltage Devices 2006/95/EC**
- **Electromagnetic Compatibility 2004/108/EC**

### Notes:

- This declaration certifies compliance with the aforementioned Directives, but does not constitute a guarantee of characteristics.
- The safety instructions in the documentation included with the product must be observed.
- The commissioning of the products here certified is prohibited until the machine, vehicle or similar in which the product is installed conforms with the provisions and requirements of the applicable Directives.
- The operation of the products at non-standard supply voltage, as well as non-adherence to the

We further declare:

- The aforementioned product is, **according to EC Machinery Directive 2006/42/EC, Annex II Part B, designed for installation in machinery / for incorporation with other machinery to form a machine.** Within the scope of application of the EC Directive, commissioning shall be prohibited until the machinery in which this part is installed conforms with the provisions of this Directive.
- The aforementioned product may, with reference to **EC Directive 97/23/EC concerning pressure equipment**, only be used in accordance with its intended use and in conformity with the instructions provided in the documentation. The following must be observed in this regard:

The product is neither designed nor approved for use in conjunction with fluids of Group 1 (Dangerous Fluids) as defined in Article 2, Para. 2 of Directive 67/548/EEC of June 27, 1967.

The product is neither designed nor approved for use in conjunction with gases, liquefied gases, pressurized gases in solution, vapors, or such fluids

When used in conformity with their intended use, the products supplied by SKF Lubrication Systems Germany GmbH do not reach the limit values listed in Article 3, Para. 1, Clauses 1.1 to 1.3 and Para. 2 of Directive 97/23/EC. They are therefore not subject to the requirements of Annex 1 of the Directive. Consequently, they do not bear a CE marking in respect of Directive 97/23/EC. SKF Lubrication Systems Germany GmbH classifies them according to Article 3, Para. 3 of the Directive.

The Declaration of Conformity and Incorporation forms part of the product documentation and is supplied together with the product.

## General information

### Explanation of symbols and signs

You will find these symbols, which warn of specific dangers to persons, material assets, or the environment, next to all safety instructions in these assembly instructions.

Please heed these instructions and proceed with special care in such cases. Please pass all safety instructions to other users.

Instructions attached directly to the equipment, such as rotational direction arrows and fluid connection labels, must be followed. Replace such signs if they become illegible.

- Rotation arrow
- Fluid connection labels

must be followed and kept in fully legible condition.

### Indicators used with safety instructions, and their significance

Signal word	Application
<b>Danger!</b>	Risk of serious injury or death
<b>Warning!</b>	Danger of damage to property and the environment
<b>Note!</b>	Provides additional information

### Prohibition symbols



DIN 4844-2  
P008 Do not touch



### You are responsible!

Please read the assembly instructions thoroughly and follow the safety instructions.

### Hazard symbols



DIN 4844-2  
W000 General hazard



DIN 4844-2  
W008 Electricity



DIN 4844-2  
W026 Hot surface



DIN 4844-2  
W028 Slipping hazard

### Informational symbols



Note



Prompts an action



Used for itemizing



Refers to other facts, causes, or consequences



Provides additional information

## Product designation

Centrifugal pump

**Original assembly instructions** acc. to EC Machinery

Directive 2006/42/EC

Product series: PR... / PRG... / PRT... /  
PRA... / HCT... / PRK...

# 1. Safety instructions

Please observe the following safety instructions to ensure trouble-free functioning of the pump and to prevent damage.



The operator of the described product must ensure that the assembly instructions are read and understood by all persons tasked with the assembly, operation, maintenance, and repair of the product. The assembly instructions must be kept readily available.



Note that the assembly instructions form part of the product and must accompany the product if sold to a new owner.

The product described here is manufactured in accordance with the generally accepted rules and standards of industry practice and with occupational safety and accident prevention regulations. Risks may, however, arise from its usage and may result in physical harm to persons or damage to other material assets. Therefore the product may only be used in proper technical condition and in observance of the assembly instructions.

In particular, any malfunctions which may affect safety must be remedied immediately.

Appropriate safety measures must be taken according to the parameters of the media being supplied.



Safety mechanisms on the device must not be damaged, deactivated, rendered inoperable, or replaced by parts that have not been expressly approved by SKF Lubrication Systems Germany GmbH.



In addition to the assembly instructions, general statutory regulations and other regulations for accident prevention and environmental protection must be observed and applied.

## 1.1 Intended use



All products from SKF Lubrication Systems Germany GmbH may be used only for their intended purpose and in accordance with the information in the product's assembly instructions.

The pumps may only be used in accordance with the technical documentation and the specifications on the rating plates. In particular, the pumps are prohibited from use in areas requiring devices of Equipment Group I.

Spandau immersion pumps **PR... / PRG... / PRT... / PRA... / HCT... / PRK...** are single-stage or multi-stage centrifugal pumps for feeding non-aerated fluids without abrasive or long-fibered components.

They are designed for vertical installation.



Continuous operation of the immersion pumps without a medium (dry running) is not permitted.

Any other use is deemed non-compliant with the intended use and could result in damage, malfunction, or even injury.



Only media approved for the type of pump may be fed. Unsuitable media may result in pump failure and potentially severe injury or death and property damage.



If feeding a fluid whose density and/or viscosity deviates from that of approved media, ensure that energy requirements are met in consideration of the hydraulic output.



The unit must not be operated if the non-metallic materials in the unit are incompatible with the medium.

## 1. Safety instructions



All instructions placed directly on the pump regarding direction of rotation, dry running, bypass connection, and the rating plate must be followed and kept in fully legible condition.



Unauthorized alterations to the pump and the use of unapproved spare parts and accessories are prohibited and nullify the warranty.



The unit must not be operated if damaged, e.g. deformed.



Any influence by foreign substances must be prevented.

Worn-out units must be rendered inoperable and then disposed of properly.

In particular, the described product is neither designed nor approved for use in conjunction with fluids of Group 1 (Dangerous Fluids) as defined in Article 2, Para. 2 of Directive 67/548/EC of June 27, 1967.

The described product is neither designed nor approved for use in conjunction with gases, liquefied gases, pressurized gases in solution, vapors, or such fluids whose vapor pressure exceeds normal atmospheric pressure (1013 mbar) by more than 0.5 bar at their maximum permissible temperature.

Unless specially indicated otherwise, products from SKF Lubrication Systems Germany GmbH are not approved for use in potentially explosive areas as defined in the ATEX Directive 94/9/EC.

### 1.2 Authorized personnel

Only qualified technical personnel may install, operate, maintain, and repair the products described in the assembly instructions. Qualified technical personnel are persons who have been trained, assigned, and instructed by the operator of the final product into which the product described here is incorporated.

Such persons are familiar with the relevant standards, rules, accident prevention regulations, and assembly conditions as a result of their training, experience, and instruction. They are qualified to carry out the required activities and in doing so recognize and avoid potential hazards.



Serious injury or death and property damage may result from improperly connected units.



Alteration and repair work may only be performed by persons possessing the knowledge and certifications required for the potentially explosive atmosphere.

The definition of qualified personnel and the prohibition against employing non-qualified personnel are laid down in DIN VDE 0105 and IEC 364.



### 1.3 Electric shock hazard

Electrical connections for the described product may only be established by qualified and trained personnel authorized to do so by the operator, and in observance of the local electrical operating conditions and local regulations (e.g., DIN, VDE). Serious injury or death and property damage may result from improperly connected products.



Performing work on products that have not been de-energized may result in serious injury or death. Assembly, maintenance, and repair work may only be performed on products that have been de-energized by qualified technical personnel. The supply voltage must be switched off before opening any of the product's components.

### 1.4 Hydraulic pressure hazard



The product described here is pressurized during operation. The product must therefore be depressurized before starting assembly, maintenance or repair work, or any system modifications or system repairs.

### 1.5 Hazard from rotating components



Touching the rotating impeller during startup, shutdown, trial run, setup, fault-finding, fault resolution, maintenance, or inspection can result in severe injury.



Touching the pump in the area of the intake opening is prohibited during operation.

### 1.6 Hazard from hazardous or dangerous substances



Safety measures must be taken according to the parameters of the media in use, especially in the case of hazardous or dangerous substances.



Leakage occurring during the feeding of hazardous or dangerous substances must be removed in such a way that it presents no risk to persons or the environment and in observation of statutory provisions.

## 2. Pumped media

### 2.1 PR...

- Emulsions, including with chem. additives
- Low-viscosity oils
- Water in various qualities
- Others

Their open impeller design allows for small particles in the return flow.

Temperature range of medium:  
0°C to +60°C

Consult the supplier for different temperatures/environmental conditions.

### 2.2 PRG...

- Aqueous emulsions (with synthetic/mineral oil), including with chem. additives
- Drinking water
- Distilled water
- Deionized water
- Alkaline and acidic solutions
- Photo developer fluids
- Others

Temperature range of medium:  
-20°C to +60°C

Maximum grain size: 0.3 mm

For heavily contaminated media, please select type designations PRT... or PRA... (PPU plastic) with open impellers.

### 2.3 PRT... / PRA...

- Aqueous emulsions (with synthetic/mineral oil), including with chem. additives
- Oils
- Drinking water
- Distilled water
- Deionized water
- Alkaline and acidic solutions
- Photo developer fluids
- Others

Temperature range of medium:  
-30°C to +60°C

## 2.4 HCT...

- Cooling brines
- Heat-transfer oils
- Deionized water
- Alkaline and acidic solutions in various concentrations
- Chemicals, especially organic solvents
- Cleaning agents
- Others

Temperature range of medium:  
-100°C to +150°C

(Important note: the maximum permissible operating temperature is lower with a higher number of pump stages.)

## 2.5 PRK...

- Emulsions
- Cooling und cutting oils
- Cleaning fluids
- Water
- Mild acids
- Others

Temperature range of medium:  
+5°C to +60°C

Maximum grain size: 3 mm

## 3. Assemblies and type designation

Spandau immersion pumps of the **PR... / PRG...** / **PRT... / PRA.../ HCT...** / **PRK...** series are available in various sizes which differ chiefly in terms of dimensions and delivery output. All sizes function in the same way. See the rating plate for the size and designation of your pump, as well as other important data.

### 3.1 PR... series

#### Type code for PR...

Designation	PR4	E	-	120	+XXX
<b>Group</b>					
Delivery head 4 m					
<b>Single-phase AC</b>					
<b>Separator</b>					
<b>Immersion depth [mm]</b>					
90 / 120					
<b>Electrical supply <sup>1)</sup></b>					
Please specify voltage/frequency, e.g. 230/400 V 50 Hz					

<sup>1)</sup> Other designs available on request

### 3.2 PRG... series

#### Type code for PRG...

Designation	PRG	E	12	120	+XXX
<b>Group</b>					
<b>Single-phase AC</b>					
<b>Frame size</b>					
6 = 1- stufig (6m)					
12 = 2- stufig (12m)					
18 = 3- stufig (18m)					
23 = 4- stufig (23m)					
<b>Separator</b>					
<b>Immersion depth [mm]</b>					
120...300					
<b>Electrical supply <sup>1)</sup></b>					
Please specify voltage/frequency, e.g. 230/400 V 50 Hz					

<sup>1)</sup> Other designs available on request

### 3.3 Series PRT... / PRA... / HCT...

#### Type code for PRT... / PRA... / HCT...

Designation	PRT	E	12	H	-	120	+XXX
<b>Group</b>							
PRT = standard							
PRA = design for increased requirements							
<b>Single-phase AC</b>							
<b>Frame size</b>							
5 = 1-stage (5m)							
6 = 1-stage (6m)							
7 = 1-stage (7m)							
8 = 1-stage (8m)							
12 = 2-stage (12m)							
17 = 3-stage (1.7m)							
22 = 4-stage (2.2m)							
27 = 5-stage (2.7m)							
H = 50Hz 60Hz (with impeller change)							
K = 50/60Hz (without impeller change)							
<b>Separator</b>							
<b>Immersion depth [mm]</b>							
120...300							
<b>Electrical supply <sup>1)</sup></b>							
Please specify voltage/frequency e.g.							

Please specify voltage/frequency e.g.

## 3.4 PRK... series

## Type code for PRK...

Designation	PRK	03	04	P	B	S	255	G	05	BA
<b>Group</b>										
<b>Frame size</b>										
<b>Number of stages</b>										
01 = 1-stage to										
05 = 5-stage										
<b>Material</b>										
P = POM (standard)										
<b>Seal type</b>										
B = Socket (standard)										
<b>Pump design</b>										
S = Basic equipment										
C = With strainer										
<b>Immersion depth [mm]</b>										
090 = 90 mm to										
410 = 410 mm										
<b>Motor index</b>										
Example: F = 0.55 kW										
<b>Electrical supply 1)</b>										
01 = 230/400 V 50 Hz, 265/460 V 60 Hz										
05 = 230/400 V 50 Hz										
<b>Motor design</b>										
AA = Standard up to 0.55 kW										
BA = Standard from 0.75 kW										

## 4. Design and function

### 4.1 PR...

The adjacent figure shows the basic structure of the PR4 pump series.

The pumps are utilized in suction operation. They are designed for vertical installation. The electric drive is seated on the pump port or flange-type end shield. The individual impeller runs in the pump chamber that is fastened to the lower part of the pump port. This port, the electric drive or the pump port/flange-type end shield contain the bearing mounting of the pump shaft.

The pump is sealless.

The pump port also contains the pressure connection and a connecting flange for mounting on a reservoir. The open pump impeller feeds the medium that is suctioned through the intake opening in the bottom area of the pump to the pressure connection. The electrical connection is established using a terminal box.

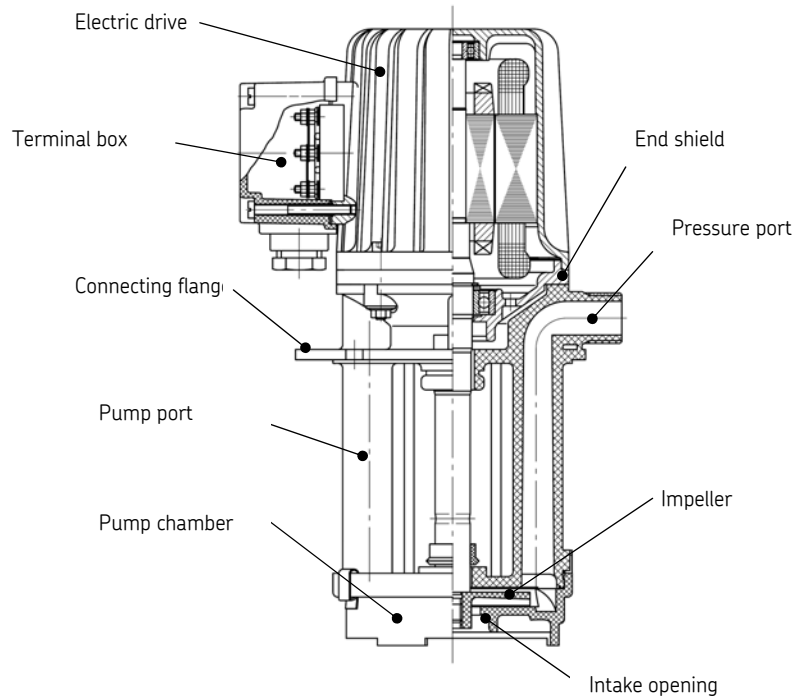


Figure 1 Design of PR...

## 4.2 PRG...

The adjacent figure shows the basic structure of the PRG... pump series.

The pumps are utilized in suction operation. They are designed for vertical installation. The electric drive is seated on the pump port or flange-type end shield. The individual impellers run in the pump chambers that are fastened to the lower part of the pump port. This port, the electric drive or the pump port/flange-type end shield contain the bearing mounting of the pump shaft.

The pump ports are sealless. The pump port also contains the pressure connection and a connecting flange for mounting on a reservoir. A variable number of closed pump impellers feeds the medium that is suctioned through the intake opening in the bottom area of the pump to the pressure connection. The electrical connection is established using a terminal box.

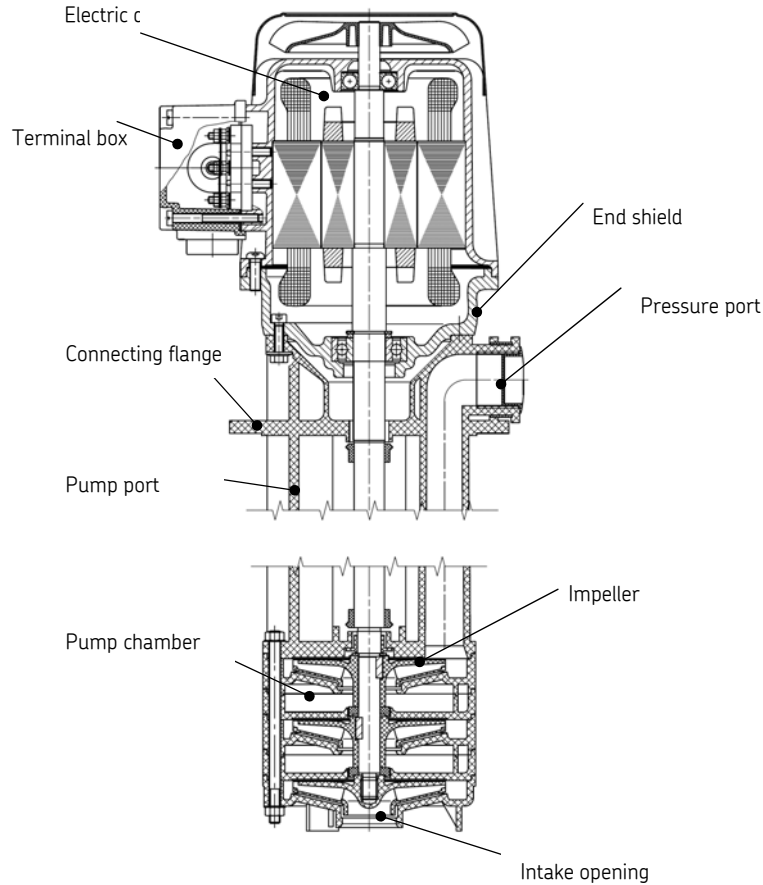


Figure 2 Design of PRG...

## 4.3 PRT... / PRA... / HCT...

The adjacent figure shows the basic structure of the PRT... / PRA... / HCT... pump series. The pumps are utilized in suction operation. They are designed for vertical installation. The electric drive is seated on the pump port or flange-type end shield. The individual impellers run in the pump chambers that are fastened to the lower part of the pump port. This pump port and the electric drive contain the bearing mounting of the pump shaft. The pump ports are sealless. The pump port also contains the pressure connection and a connecting flange for mounting on a reservoir. A variable number of open pump impellers feeds the medium that is suctioned through the intake opening in the bottom area of the pump to the pressure connection. The electrical connection is established using a terminal box.

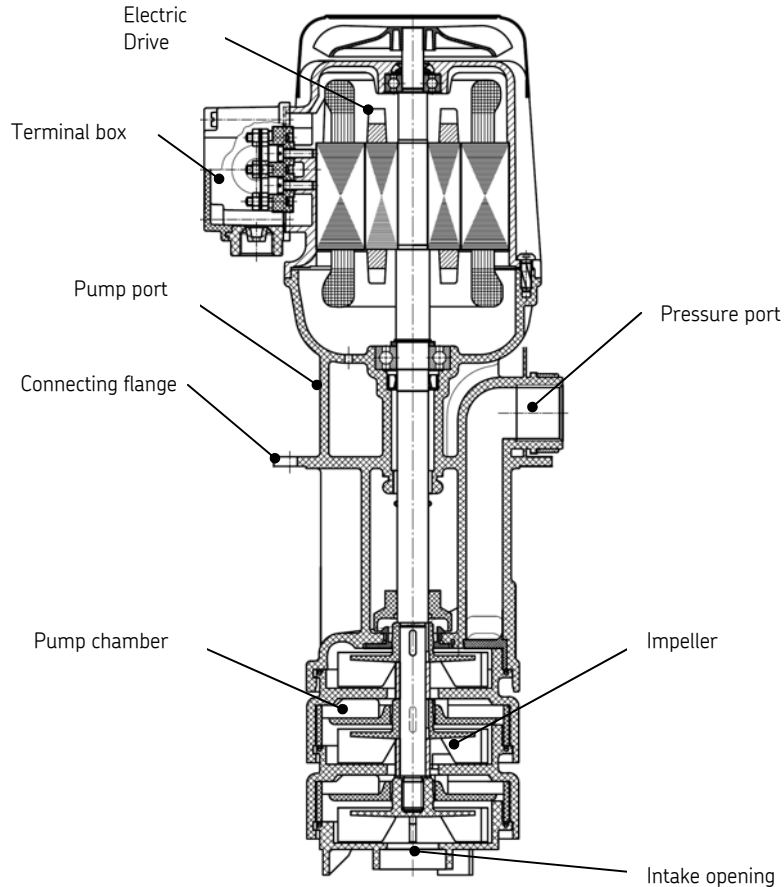


Figure 3 Design of PRT ... / PRA... / HCT...



#### 4.4 PRK...

The adjacent figure shows the basic structure of the PRK... pump series.

The pumps are utilized in suction operation. They are designed for vertical installation. The electric drive is seated on the pump port or flange-type end shield. The individual impellers run in the pump chambers that are fastened to the lower part of the pump port. This pump port and the electric drive contain the bearing mounting of the pump shaft.

The pump ports are sealless. The pump port also contains the pressure connection and a connecting flange for mounting on a reservoir. A variable number of open pump impellers feeds the medium that is suctioned through the intake opening in the bottom area of the pump to the pressure connection. The electrical connection is established using a terminal box.

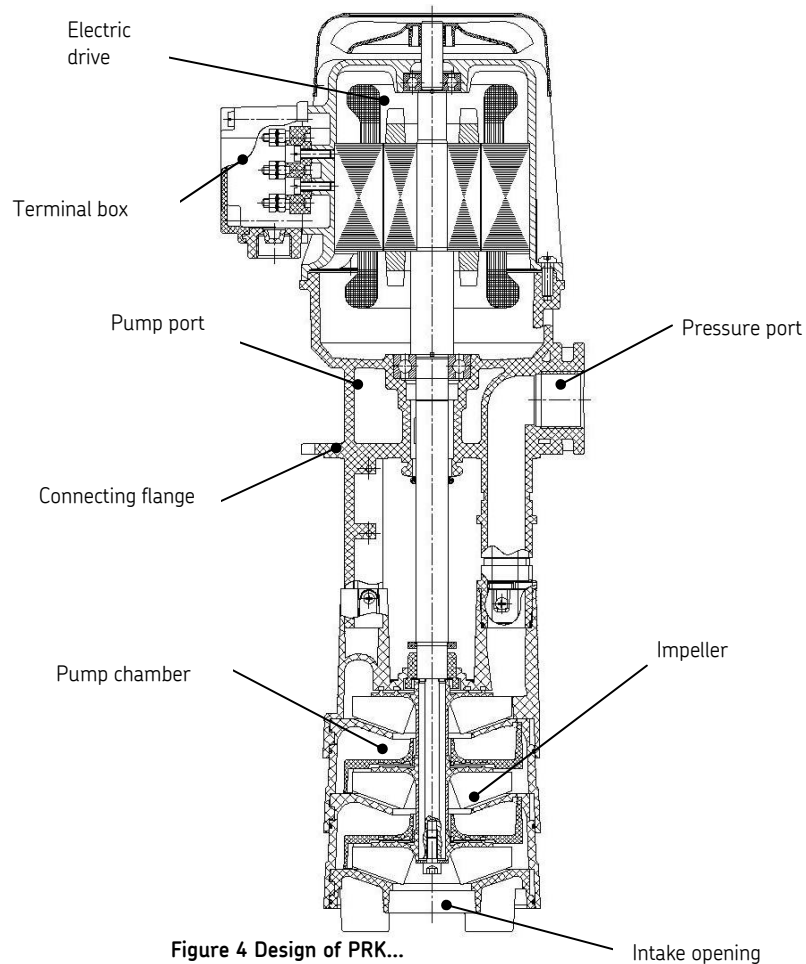


Figure 4 Design of PRK...

Intake opening

## 5. Assembly instructions

Only qualified technical personnel may install, operate, maintain, and repair the products described in the assembly instructions. Qualified technical personnel are persons who have been trained, assigned, and instructed by the operator of the final product into which the product described here is incorporated. Such persons are familiar with the relevant standards, rules, accident prevention regulations, and operating conditions as a result of their training, experience, and instruction. They are qualified to carry out the required activities and in doing so recognize and avoid potential hazards.

The definition of qualified personnel and the prohibition against employing non-qualified personnel are laid down in DIN VDE 0105 and IEC 364.

Before assembling/setting up the product, remove the packaging material and any shipping braces (e.g., plugs on suction or pressure port). The packaging material must be preserved until any discrepancies are resolved.



Do not tilt or drop the product.

During all assembly work on machinery, observe the local accident prevention regulations as well

as the applicable operating and maintenance specifications.

### 5.1 Setup

Spandau immersion pumps of the PR... / PRG... / PRT... / PRA... / HCT... / PRK... series are designed for vertical reservoir installation.

Please contact your pump supplier if you need a pump for installation in a different position. Before installing the pump, remove the packaging material and shipping braces (e.g., plugs on suction or pressure connection).

If an intake pipe was supplied with the product, it must be inserted tight into the pump bottom before the pump is assembled. Select the sealing material based on the operating conditions and temperature. When inserting the intake pipe, the sealing material must not enter the pump chamber or the inner area of the pipe.

The pump is equipped with a 4-hole connecting flange with standard port dimensions (see "Technical data") for assembly.

The screw connections must be permanently secured against loosening.

When selecting the installation location, ensure sufficient space for installation, cabling, inspection, and venting. The distance between the air inlet on the motor and the walls, components, etc. must be at least  $\frac{1}{4}$  of the diameter of the air inlet opening. The direction of

the air flow is from the air inlet opening to the pump.



If no customer documentation is available, you can request the customer documentation directly from SKF Lubrication Systems Germany GmbH.

The product should be protected from humidity and vibration, and should be mounted so that it is easily accessible, allowing all further installation work to be done without difficulty. Ensure that there is sufficient air circulation to prevent excessive heating of the product. The maximum permissible ambient temperature is 40°C for all series described here.

## 5.2 Permissible fluid levels

### PR...

When setting up the pump, observe the highest permissible fluid level and the minimum fluid level (see Figure 5).

When switching on the pump, the minimum fluid level must be above the lowest pump chamber ①.

The pump then feeds up to the intake opening in the chamber. The highest permissible fluid level is 20 mm below the reservoir cover ②.

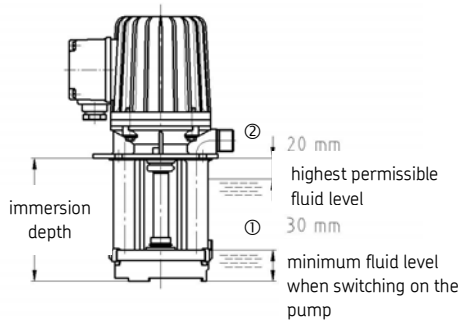


Figure 5 Permissible fluid level for PR...

### PRG...

When setting up the pump, observe the highest permissible fluid level and the minimum fluid level (see Figure 6).

When switching on the pump, the minimum fluid level must be above the lowest pump chamber ①.

The pump then feeds up to the intake opening in the chamber or up to the intake opening of the pipe extension.

The highest permissible fluid level is 20 mm below the reservoir cover ②.

### Design with pipe extension (with non-standard immersion depth)

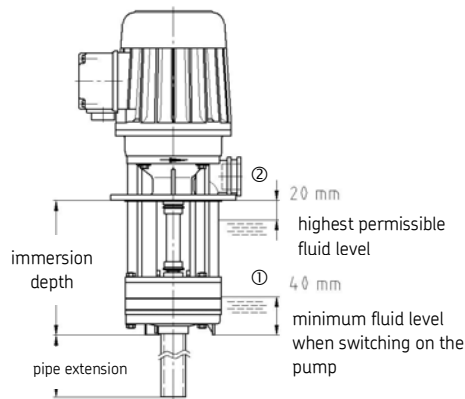


Figure 6 Permissible fluid level for PRG...

### PRT... / PRA... / HCT...

When setting up the pump, observe the highest permissible fluid level and the minimum fluid level (see Figure 7).

When switching on the pump, the minimum fluid level must be above the lowest pump chamber ①.

The pump then feeds up to the intake opening in the chamber or up to the intake opening of the pipe extension.

The highest permissible fluid level is 20 mm below the reservoir cover ②.

### Design with pipe extension (with non-standard immersion depth)

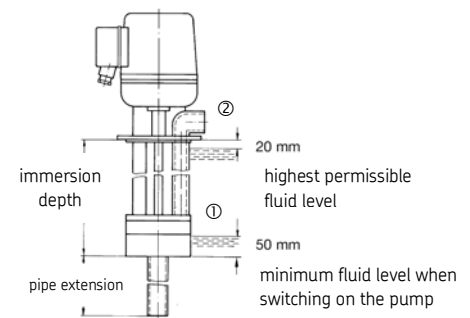


Figure 7 Permissible fluid level for PRT... / PRA... / HCT...

**PRK...**

When setting up the pump, observe the highest permissible fluid level and the minimum fluid level (see Figure 8).

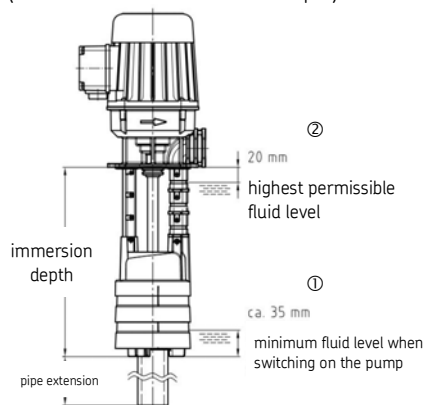
When switching on the pump, the minimum fluid level must be above the lowest pump chamber ①.

The pump then feeds up to the intake opening in the chamber or up to the intake opening of the pipe extension.

The highest permissible fluid level is 20 mm below the reservoir cover ②.

**Design with pipe extension**

(with non-standard immersion depth)



**Figure 8 Permissible fluid level for PRK...**

**5.3 Port dimensions**

See the "Technical data" chapter.

**5.4 Pipe arrangement**

When arranging the lines, observe the following instructions to ensure that the supply circuit functions smoothly.

- All line components such as pipes, shut-off devices, valves, etc. that come into contact with the medium must be cleaned thoroughly. No seals in the lines may protrude inwards so that contaminants cannot enter the pump and damage or destroy the pump.
- Only use pipes or hoses suitable for the operating pressure of the specific pump, the prevailing temperatures, and the media that will be fed.
- The lines must be connected in such a way that no forces are transferred to the pump (stress-free connection). It is therefore recommended that delivery lines be connected to the pump before the pump is fastened to the reservoir cover.
- The flow of medium in the lines should not be impeded by the incorporation of sharp

bends, angle valves, or flap valves. Unavoidable changes in the cross-section in the feed paths must have smooth transitions. Sudden changes of direction should always be avoided.

- The lines must always be free of leaks and arranged so that air pockets cannot form anywhere.
- The pipes should always rise upward. Delivery lines should be ventable at the highest point.
- The cross-section of the delivery line should be sized at least as large as the cross-section of the pressure connection port.

**5.5 Pipe connection**

Connect the pipes to the provided connection port on the pump port. In doing so, ensure that no forces are transferred to the pump.

It is recommended that the thread be tapered on components that will be screwed into the discharge stub. At an operating pressure above 6 bar, the thread should be sealed against the machined end face.

**Do not exceed a tightening torque of 15 Nm, as higher torque may incur a risk of the discharge stub cracking or breaking off.**

## 5.6 Screw union on reservoir

After the delivery line is installed, the pump can be screwed onto the reservoir. **Do not exceed a tightening torque of 2 Nm on plastic pumps.**

## 5.7 Electrical connection



Electrical connections for the pump may only be established by qualified and trained personnel. The instructions in these operating instructions must be observed.



The reservoir must be equipped with equipotential bonding and be integrated into the equipotential bonding system.

The pump motor must be connected according to the specifications on the rating plate and the mains voltage.

Establish the connection in accordance with the relevant VDE standards, for example VDE 0100, VDE 0101 and VDE 0165, and the conditions for connections of the responsible power-supply companies.

The cables and lines must be fastened using a cable fitting with strain relief in the terminal box.

Implement the circuit according to the wiring diagram on the motor's terminal box.

If a pump has been stored unused in a humid area for an extended time, it is recommended

that the insulation resistance of the winding against the housing be measured before startup.

On low-voltage motors, the minimum value at a winding temperature of approx. 20°C is 1 kΩ per volt of rated voltage. If the resistance is lower than this, the motor must be dried in a warm area or using heaters until the required insulation value is attained.

## 5.8 Direction of rotation

The direction of motor rotation must match the arrow on the pump. To check the direction of rotation, open the valves in the delivery and intake lines and switch on the motor briefly (approx. 1 s).

When switching on the system, the pump chamber must be filled with fluid.



The pump will be damaged if the direction of rotation is incorrect.

## Product designation

Centrifugal pump

## Operating instructions

Product series: PR... / PRG... / PRT... /  
PRA... / HCT... / PRK...

## 6. Transport, delivery, and storage

SKF Lubrication Systems Germany GmbH products are packaged in accordance with standard commercial practice according to the regulations of the recipient's country and DIN ISO 9001. Safe handling must be ensured during transport. The product must be protected from mechanical effects such as impacts. The transport packaging must be marked "Do not drop!"

The pump must be transported properly.  
 . Use the lifting eyes on the product.



Do not tilt or drop the product.

There are no restrictions for land, air, or sea transport.

After receipt of the shipment, the product(s) must be inspected for damage and for completeness according to the shipping documents. The packaging material must be preserved until any discrepancies are resolved.

SKF Lubrication Systems Germany GmbH products are subject to the following storage conditions:

### 6.1 Pump units

- Ensure that the storage environment is dry, dust-free and low-vibration ( $v_{\text{eff}} \leq 0.2 \text{ mm/s}$ ). The grease service life of the bearings is reduced over an extended period of storage.
- If the product is stored for more than 12 months, inspect the condition of the grease before recommissioning. The insulation resistance of the motor winding against the housing must also be measured. Dry the motor winding if the values are  $\leq 1 \text{ k}\Omega$  per volt of rated voltage.
- The grease service life of the bearings is reduced over an extended period of storage.

### 6.2 Electronic and electrical devices

- Ambient conditions: dry and dust-free surroundings, storage in well ventilated dry area
- Storage time: Max. 24 months
- Permissible humidity:  $< 65\%$
- Storage temperature:  $10$  to  $40^\circ\text{C}$
- Light: Avoid direct sun or UV exposure and shield nearby sources of heat

### 6.3 General notes

- The product(s) can be enveloped in plastic film to provide low-dust storage.
- Protect against ground moisture by storing on a shelf or wooden pallet.
- Bright-finished metallic surfaces, especially wearing parts and assembly surfaces, must be protected using long-term anti-corrosive agents before storage.
- At approx. 6-month intervals: Check for corrosion. If there are signs of corrosion, reapply anti-corrosive agents.
- Drives must be protected from mechanical damage.

## 7. Operation and commissioning


Inspect all connections before commissioning the pump. It is imperative that the suction port and pressure port of the pump be open.

The maximum ambient temperature of the pump must not exceed 40°C (see Chapter 5.1).

The pump must run smoothly and evenly. To inspect, you can remove the fan cowl and manually turn the pump shaft on the fan impeller several times. Reinstall the fan cowl after inspection.

Check the direction of pump rotation during startup. The direction of rotation must match the arrow on the pump housing or fan cowl.

The pump must always be filled with fluid for pumping to maintain its self-priming capability. Before startup, fill the pump with fluid for pumping.

 The pump must not run dry. An incorrect direction of rotation and/or dry running can damage the pump.

Ensure that there is no excessive dirt/contamination in the reservoir or pipe system and that the upstream filter functions properly.

Bring the pump into operation as follows:

- |                                                                                                                                                                                             |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>• Completely open the pressure-side shutoff valve (if present) or ensure that the connection on the pressure side is free.</li> </ul>                |
| <ul style="list-style-type: none"> <li>• Ensure that the pump chamber is filled with fluid.</li> </ul>                                                                                      |
| <ul style="list-style-type: none"> <li>• Switch on the pump and check the direction of rotation. The direction of rotation must match the arrow on the pump housing or fan cowl.</li> </ul> |
| <ul style="list-style-type: none"> <li>• Run the pump until the feeding process stabilizes and the medium no longer contains air bubbles.</li> </ul>                                        |
| <ul style="list-style-type: none"> <li>• You can now set the desired delivery rate by adjusting the pressure-side shutoff valve.</li> </ul>                                                 |

• The pumps should be used in continuous operation to the extent possible. If this is not possible due to the process, then the pump's constant flow rate should be regulated using a regulating valve for example.

Please consult your supplier if the pump will run in intermittent operation with short intervals.

The pump may only operate within the specified delivery range. See the rating plate on the pump for the relevant key data.

When the pump operates without interruption, the minimum fluid level can fall to the intake opening. It must be ensured that the fluid level does not fall further during pump operation to prevent the pump from running dry.

A backflow preventer is recommended for high delivery heads, long pipes, and pumps in suction operation. This prevents the pump from running empty after it is switched off.



The pump must not run dry, as it may otherwise be damaged.



Touching the rotating impeller during startup, shutdown, trial run, setup, fault-finding, fault resolution, maintenance, or inspection can result in severe injury.



Touching the pump in the area of the intake opening is prohibited during operation.



## 8. Shutdown

### 8.1 Temporary shutdown

If the pump will be shut down temporarily, anti-rust preservation should be applied.

The described product can be shut down temporarily by disconnecting the electrical and hydraulic supply connections. The instructions in the "General information" chapter in these assembly instructions must be observed when doing so.

To recommission the product, follow the instructions in the "Assembly instructions" and "Commissioning" chapters in these assembly instructions.

### 8.2 Permanent shutdown

If the product will be permanently shut down, the local regulations and laws regarding the disposal of contaminated equipment must be observed.



Lubricants can contaminate soil and waterways. Lubricants must be used and disposed of properly. Observe the local regulations and laws regarding the disposal of lubricants.

The product can also be returned to SKF Lubrication Systems Germany GmbH for disposal, in which case the customer is responsible for reimbursing the costs incurred.

## 9. Maintenance

### General notes



Performing work on products that have not been de-energized may result in serious injury or death. Assembly, maintenance, and repair work may only be performed on products that have been de-energized by qualified technical personnel. The supply voltage must be switched off before opening any of the product's components.



The product described here is pressurized during operation. The product must therefore be depressurized before starting assembly, maintenance or repair work, or any system modifications or system repairs.



Touching the rotating impeller during startup, shutdown, trial run, setup, fault-finding, fault resolution, maintenance, or inspection can result in severe injury.



Touching the pump in the area of the intake opening is prohibited during operation.

Spandau immersion pumps of the PR... / PRG... / PRT... / PRA... series / HCT... / PRK... are largely maintenance-free. However, you should inspect the

pump for external damage and leaks at regular intervals to ensure proper function.

Inspect media and pre-filters or strainers for contamination at regular intervals and clean or replace as necessary.

Ensure that the housing of the pump motor is kept free of dust, foreign substances, etc. to provide good heat exchange between the motor and the ambient air and maintain proper surface cooling.

Cables and lines must be inspected for damage and secure electrical connection at regular intervals.

If a pump has been stored unused in a humid area for an extended time, it is recommended that the insulation resistance of the winding against the housing be measured before startup. On low-voltage motors, the minimum value at a winding temperature of approx. 20 °C is 2 megaohm. If the resistance is lower than this, the motor must be dried in a warm area or using heaters until the required insulation value is attained.

Any faults found must be properly rectified before the pump is restarted.



Dismantling of the product or individual parts thereof within the statutory warranty period is not permitted and voids any claims.



Only original spare parts from SKF Lubrication Systems Germany GmbH may be used. Unauthorized alterations to products and the use of non-original spare parts and accessories are prohibited and nullify the statutory warranty.

SKF Lubrication Systems Germany GmbH shall not be held liable for damages resulting from improperly performed assembly, maintenance or repair work on the product.



All parts must be handled with utmost care during assembly and disassembly. Jolts and impacts must be avoided.

Thoroughly clean all parts and refurbish or replace them with spare parts as necessary.



Unauthorized alterations to the pump and the use of unapproved spare parts and accessories are prohibited and nullify the warranty.

## 10. Malfunctions



Dismantling of the motor and pump functional assemblies within the statutory warranty period is not permitted and voids any claims.



Only original spare parts from SKF Lubrication Systems Germany GmbH may be used. Unauthorized alterations to products and the use of non-original spare parts and accessories are not permitted.



All actions such as repairs, part replacement, etc. may only be performed by qualified and trained personnel.



Repair work may only be performed on units that have been de-energized by qualified and trained personnel. Performing work on energized units may result in serious injury or death.



The feeding system may be under pressure. It must be depressurized before starting installation, repair, or maintenance work.

The "Fault analysis and rectification" table provides an overview of possible malfunctions and their causes. Contact the Service department of SKF Lubrication Systems Germany GmbH if you cannot remedy the malfunction.

## Fault analysis and rectification

Malfunction	Possible cause	Rectification
Motor does not start	Power connection defective	Check the power connection
	Fuse tripped	Check the fuse or the motor circuit breaker
	Motor circuit breaker tripped	Ensure that: <ul style="list-style-type: none"> <li>• The pump shaft runs smoothly and evenly</li> <li>• The values on the rating plate match the power supply</li> <li>• The resistance of the winding against the housing is at least 2 megaohm</li> <li>• Then switch the motor circuit breaker on again.</li> </ul>
	PTC thermistor upper temperature exceeded	Ensure that: <ul style="list-style-type: none"> <li>• Surface cooling is not impeded</li> <li>• The ambient temperature is below the maximum permissible value</li> <li>• The pump is not overloaded<sup>1)</sup></li> </ul> Then switch the motor circuit breaker on again
	Switching contacts or motor coil defective	Replace defective parts
Motor circuit breaker is triggered immediately after being switched on	Fuse is tripped because a phase is absent	Check the connection of the terminal board Check the fuse and replace it if necessary
	Motor circuit breaker defective	Replace motor circuit breaker
	Cable connection loose or defective	Fasten the cable connections or replace the cable
	Motor winding defective	Replace motor
	Motor circuit breaker set too low	Set the motor circuit breaker to the value specified on the rating plate and ensure that the pump is not overloaded <sup>1)</sup>
	Motor shaft jammed	Remedy the jam Ensure that the pump shaft runs smoothly and evenly
	Pump overloaded <sup>1)</sup>	Check the pump and voltage parameters

## Continuation of Fault analysis and rectification

Malfunction	Possible cause	Rectification
Motor circuit breaker is triggered occasionally	Motor circuit breaker set too low	Set the motor circuit breaker to the value specified on the rating plate and ensure that the pump is not overloaded <sup>1)</sup>
	Power supply not constant	Check the connection of the terminal board Check the fuse and replace it if necessary
	Mains voltage temporarily too low	Ensure that the values on the rating plate match the power supply Select a power supply with constant voltage
Pump output unstable	Intake partially clogged	Check the intake opening and clean it if necessary
	Pump draws air	Check the fill level of the pump and correct if necessary
	Incorrect installation	See the "Assembly instructions" chapter
Pump runs but does not deliver medium	Intake opening clogged	Check the intake opening and clean it if necessary The medium may be heavily contaminated and need to be replaced.
	Pipe extension leaky	Check the pipe extension and remedy any leaks.
	Pump lacks medium for pumping	Check fill level and correct if necessary
	Air pockets in the pump	Vent the pump
	Wrong direction of rotation	Change direction of rotation according to wiring diagram
	Shutoff valve closed	Open the shutoff valve
Noises, vibrations, or leaks	Pump draws air	Check the fill level of the pump and correct if necessary
	Suction head too low	Increase fluid level or suction head
	Shaft bearing mounting defective	Replace shaft bearing mounting

<sup>1)</sup> Among that factors that can result in pump overload are: viscosity and temperature of the medium, delivery rate, delivery head, ambient temperature, and degree of contamination.

**Continuation of Fault analysis and rectification**

Malfunction	Possible cause	Rectification
Noises, vibrations, or leaks	Shaft seal defective	Replace shaft seal
	Endplay of pump incorrect	Set endplay
	Pump not mounted securely	Fasten connecting flange
Pump shaft rotates with difficulty	Pump jammed	Check the intake opening and clean it if necessary
	Impeller scrapes/rubs	Ensure that the impeller is properly fastened and that the pump shaft is not bent or off-center
	Shaft bearing mounting defective	Replace shaft bearing mounting



Performing work on products that have not been de-energized may result in serious injury or death. Assembly, maintenance, and repair work may only be performed on products that have been de-energized by qualified technical personnel. The supply voltage must be switched off before opening any of the product's components.



The hot surface of a motor may cause burns. Motor surfaces may only be touched with appropriate gloves or after the motor has been shut off for an extended time.



Feeding systems are pressurized during operation. Centralized lubrication systems must therefore be depressurized before starting assembly, maintenance, or repair work, or any system modifications or system repairs.

# 11. Technical data

## 11.1 PR...

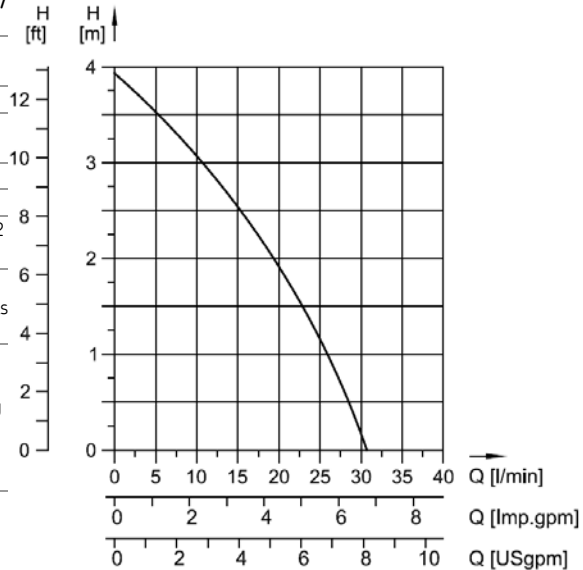
### Design features

- Centrifugal pump, 1-stage
- Open impeller
- Mounting dimensions as per DIN EN 12157
- Immersion depths: 90 mm, 120 mm
- Weight 2.5 kg
- Three-phase or single-phase operation
- Vertical installation
- G ½ male thread
- Direction of rotation: Counterclockwise as viewed from above looking down on vent side of motor

### Mechanical design

Component	Machine design PR 4	System design PR 4 / A901
Motor housing	Aluminum	Aluminum
Pump port	PPN	PPN
Flange-type end shield	Aluminum	Aluminum
Pump bottom	PPN	PPN
Impeller	POM/GF	POM/GF
Shaft	ETG	Stainless steel 1.4122
Rolling bearing	Deep groove ball bearings with 2 shields	Deep groove ball bearings with 2 shields
Splash guard	Splash ring above pump chamber	Splash ring above pump chamber Additional: splash ring below flange, V-ring below bottom rolling bearing

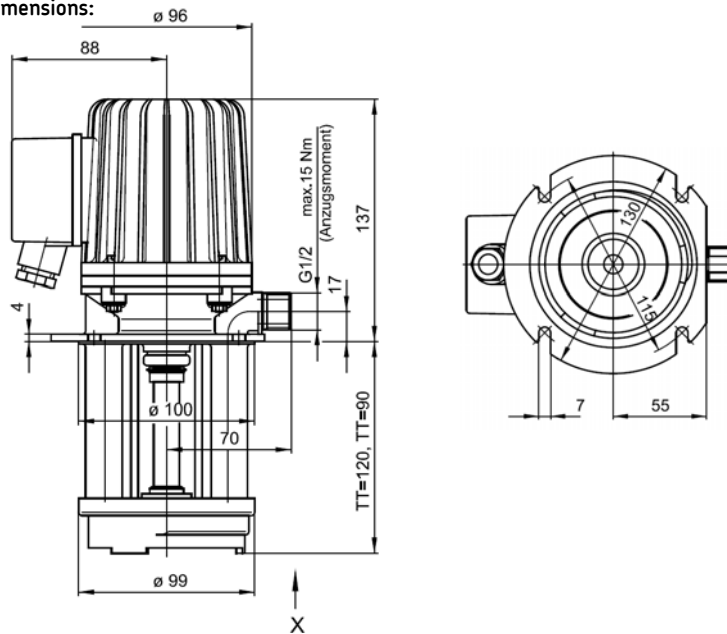
### Characteristic curve for 50 and 60 Hz



Data apply to media with viscosity of 1 mm<sup>2</sup>/s at density of 1 kg/dm<sup>3</sup>.

**Electrical values:**

Frequency [Hz]	Rated voltage $\Delta / Y$ [V]	Rated current $\Delta / Y$ [A]	Rated power [kW]	Rated speed [rpm]
50	230/400	0.33/0.19	0.05	2730
60	230/400	0.33/0.19	0.05	3300

**Dimensions:**



## 11.2 PRG...

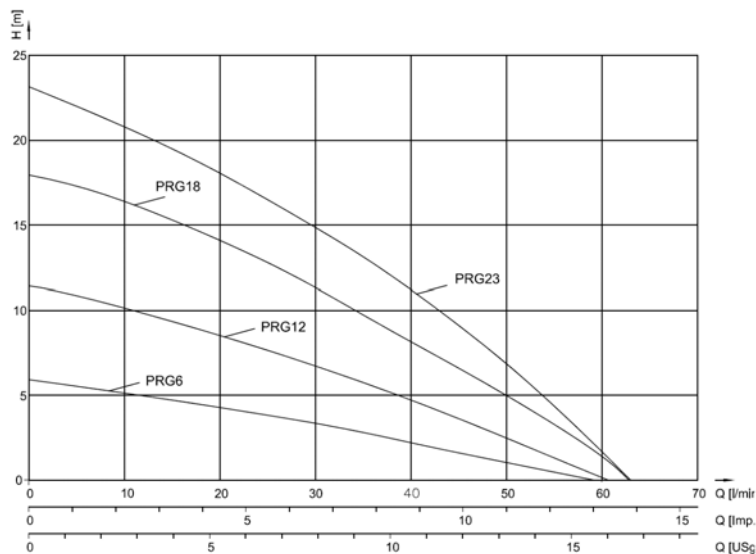
## Design features

- Sealless
- Exposed pump shaft, mounted only in the motor
- Closed impellers
- 1- to 4-stage designs
- Mounting dimensions as per DIN EN 12157
- Immersion depths to 320 mm
- 50 Hz and 60 Hz operation without impeller change
- Three-phase or single-phase drive

## Mechanical design

Component	Material
Motor housing	Aluminum
Pump port	POM/GK
Flange-type end shield	Aluminum
Pump bottom	POM / GF
Impeller	PEI/GF
Shaft	Stainless steel 1.4122
Rolling bearing	Deep groove ball bearings with 2 shields (ZZ), with permanent lubrication
Self-sealing bushing	Teflon/graphite
Small parts (in contact with medium)	Stainless steel

## Characteristic curves for 50Hz



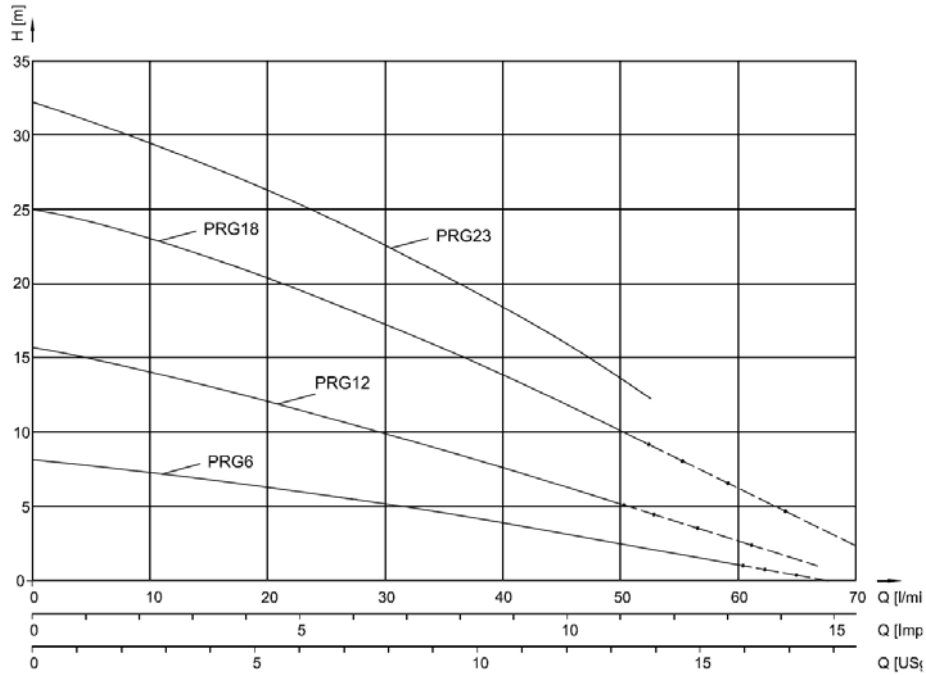
Data apply to media with viscosity of  $1 \text{ mm}^2/\text{s}$  at density of  $1 \text{ kg}/\text{dm}^3$ .

**Electrical values at 50 Hz:**

Three-phase operation						
Type	Rated power [kW]	Rated voltage $\Delta / Y$ [V]	Rated frequency [Hz]	Rated current $\Delta / Y$ [A]	Rated speed [rpm]	Noise level [dB(A)]
PRG6 1-stage	0,06	230 / 400	50	0,38 / 0,22	2773	44
PRG12 2-stage	0,12	230 / 400	50	0,71 / 0,41	2637	45
PRG18 3-stage	0,18	230 / 400	50	0,87 / 0,5	2812	48
PRG23 4-stage	0,37	230 / 400	50	1,73 / 1	2667	49

Single-phase operation						
Type	Rated power [kW]	Rated voltage $\perp$ [V]	Rated frequency [Hz]	Rated current $\perp$ [A]	Rated speed [rpm]	BC [ $\mu$ F]
PRG6 1-stage	0,06	230	50	0,56	2817	3
PRG12 2-stage	0,12	230	50	1,36	2840	6
PRG18 3-stage	0,18	230	50	1,8	2700	8
PRG23 4-stage	0,37	230	50	1,8	2800	8

## Characteristic curves for 60 Hz

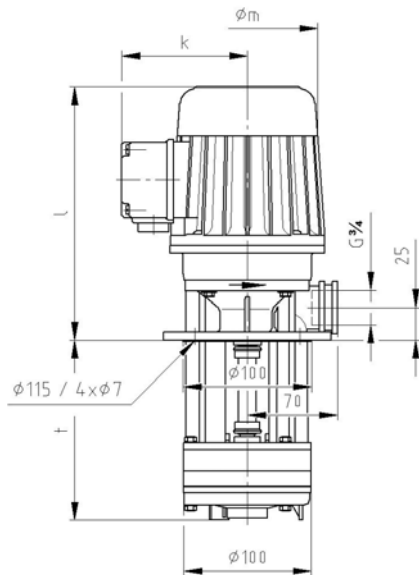


Expanded power range in single-phase operation  
 Data apply to media with viscosity of  $1 \text{ mm}^2/\text{s}$  at  
 density of  $1 \text{ kg}/\text{dm}^3$ .

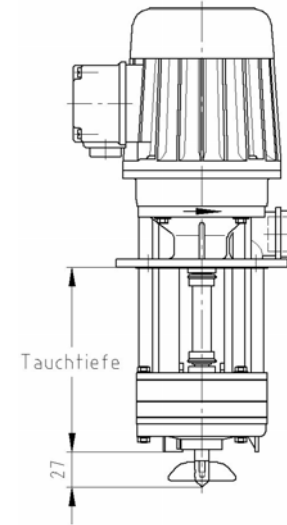
**Electrical values at 60 Hz:**

Three-phase operation						
Type	Rated power [kW]	Rated voltage $\Delta / Y$ [V]	Rated frequency [Hz]	Rated current $\Delta / Y$ [A]	Rated speed [rpm]	Noise level [dB(A)]
PRG6 1-stage	0.09	255 / 440	60	0.42 / 0.24	3257	45
PRG12 2-stage	0.16	255 / 440	60	0.74 / 0.43	3158	46
PRG18 3-stage	0.25	255 / 440	60	0.99 / 0.57	3350	50
PRG23 4-stage	0.37	255 / 440	60	1.49 / 0.86	3329	51

Single-phase operation						
Type	Rated power [kW]	Rated voltage $\perp$ [V]	Rated frequency [Hz]	Rated current $\perp$ [A]	Rated speed [rpm]	BC [ $\mu$ F]
PRG6 1-stage	0.09	230	60	0.68	3247	2
PRG12 2-stage	0.22	230	60	1.35	3430	6
PRG18 3-stage	0.35	230	60	2	3220	6
PRG23 4-stage	0.35	230	60	2	3220	6

**Dimensions and weights:**

Dimensions and weights for PRG					
Type	t [mm]	Weight [kg]	Ø m	k *)	l
PRG(E)6 1-stage	120	2.8	96	88	173
	140				
	170				
	220				
	270	3.1			
PRG(E)12 2-stage	140	2.9(4.4)	96 (120)	88 (98)	173 (197)
	160				
	190	3.3(4.8)			
	240				
	290				
PRG(E)18 3-stage	170	4.5	120	98	197
	190				
	220	4.9			
	270				
	320				
PRG(E)23 4-stage	200	4.8	120	98	197
	220				
	250	5.0			
	300				



\*) Dimension "k" is increased by +20 mm on CSA and USA designs or when equipped with thermistor-type motor protection. Standard ventilated motors come without a canopy.

If necessary – observe the respective safety regulations and laws applying to machinery protection – the motors can be supplied with a canopy at extra charge.

This increases dimension "l" by approx. 14 mm.

**Design with agitator blades**

for mixing the medium and for temperature distribution.

(Note: increases power requirement and required installation space.)

## 11.3 PRT... / PRA..

**Design features**

- Sealless
- Exposed pump shaft, mounted only in the motor
- Open impellers
- 1- to 5-stage designs
- Mounting dimensions as per DIN EN 12157
- Immersion depths to 450 mm
- 50 Hz and 60 Hz operation without impeller change
- Three-phase or single-phase drive

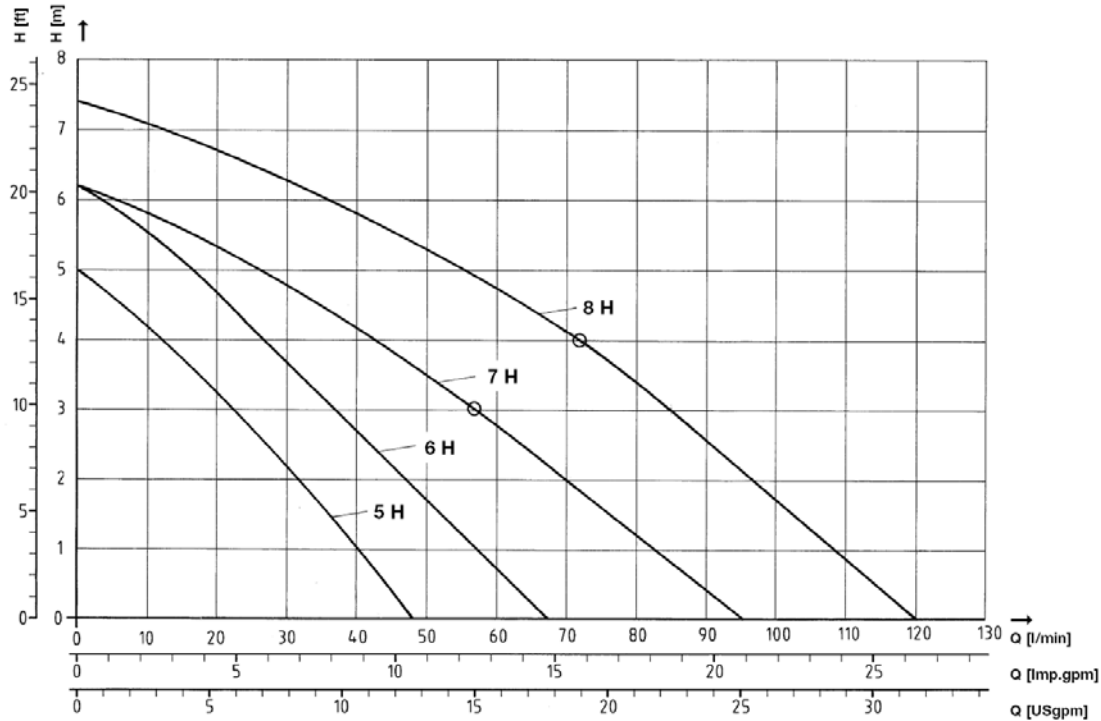
**Mechanical design**

Component	Model PRT	Model PRA
Motor housing	Aluminum	Aluminum
Pump port	PPU	PPU
Pump bottom	PPU (PRT 22, 27: LCP)	PPU (PRT 22, 27: LCP)
Intermediate chamber	PPU (PRT 22, 27: LCP)	PPU (PRT 22, 27: LCP)
Impeller	PPU	PPU
Shaft	ETG	Stainless steel 1.4122
Rolling bearing	Deep groove ball bearings with 2 shields (ZZ), with permanent lubrication	Deep groove ball bearings with 2 sealing rings (2RS), with permanent lubrication
Rotary shaft seal (below the rolling bearing)	-	FKM (FPM)
Splash ring (below the flange)	NBR	FKM (FPM)
Top splash ring (above pump chamber)	FKM (FPM)	FKM (FPM)
V-ring (between fan and motor housing)	-	NBR; unventilated except for PRA5

**Characteristic curves**

Models PRT..H/PRA..H, 1-stage, for 50 or 60 Hz

(with impeller change)



Data apply to media with viscosity of  $1 \text{ mm}^2/\text{s}$  at density of  $1 \text{ kg}/\text{dm}^3$ .

○  $Q_{\text{max}}$  in single-phase operation (operation above  $Q_{\text{max}}$  leads to overload of the drive motor).

## Electrical values:

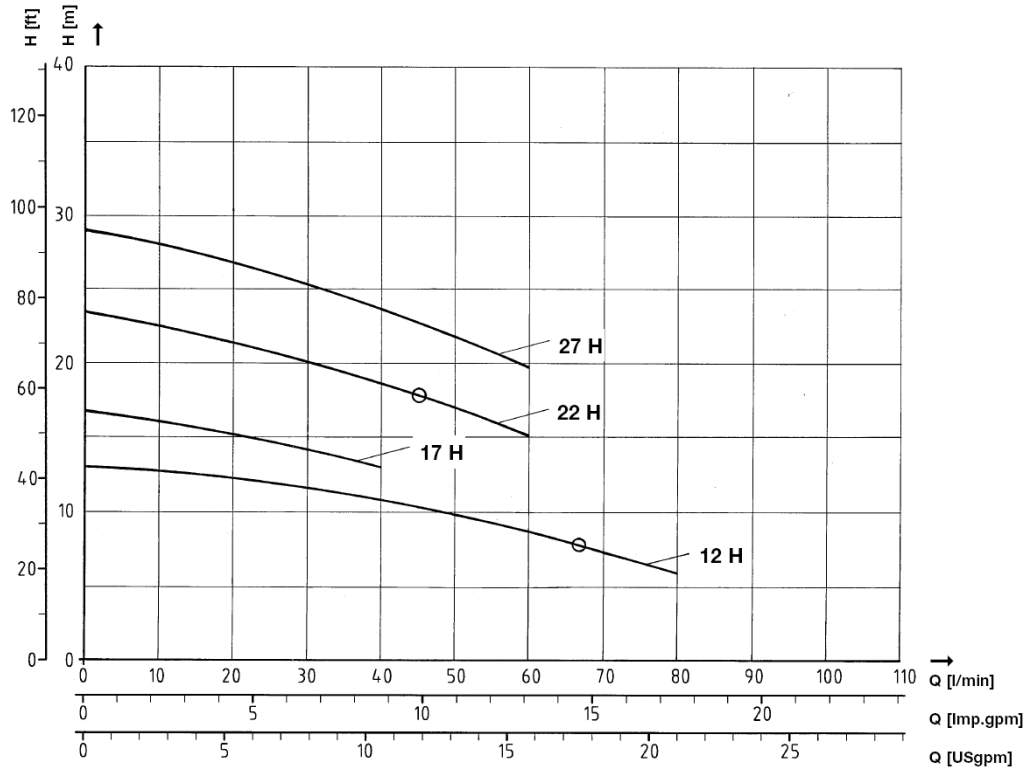
Three-phase operation							
Type		Rated power	Rated voltage	Rated frequency	Rated current	Rated speed	Noise level
		[kW]	$\Delta / Y$ [V]	[Hz]	$\Delta / Y$ [A]	[rpm]	[dB(A)]
PRT PRA	5H	0.12	230 / 400 255 / 440	50 60	0.71 / 0.41 0.65 / 0.38	2886 3494	42
	1-stage						
PRT PRA	6H	0.18	230 / 400 255 / 440	50 60	0.86 / 0.5 0.78 / 0.45	2812 3437	44
	1-stage						
PRT PRA	7H	0.18	230 / 400 255 / 440	50 60	0.86 / 0.5 0.99 / 0.57	2812 3350	44
	1-stage						
PRT PRA	8H	0.25	230 / 400 255 / 440	50 60	1.11 / 0.64 0.99 / 0.57	2701 3350	45
	1-stage						

Single-phase operation							
Type		Rated power	Rated voltage	Rated frequency	Rated current	Rated speed	BC
		[kW]	$\Delta / Y$ [V]	[Hz]	$\Delta / Y$ [A]	[rpm]	[ $\mu$ F]
PRTE PRAE	6H	0.18	230 255	50 60	1.36 1.1	2840 3486	6
	1-stage						
PRTE PRAE	7H	0.18	230 255	50 60	1.36 1.1	2840 3486	6
	1-stage						
PRTE PRAE	8H	0.18	230 255	50 60	1.36 1.1	2840 3486	6
	1-stage						



**Characteristic curves**

Models PRT..H/PRA..H, 2- to 5-stage, for 50 or 60 Hz (with impeller change)



Data apply to media with viscosity of 1 mm<sup>2</sup>/s at density of 1 kg/dm<sup>3</sup>.

○ Q<sub>max</sub> in single-phase operation (operation above Q<sub>max</sub> leads to overload of the drive motor).

**Electrical values:**

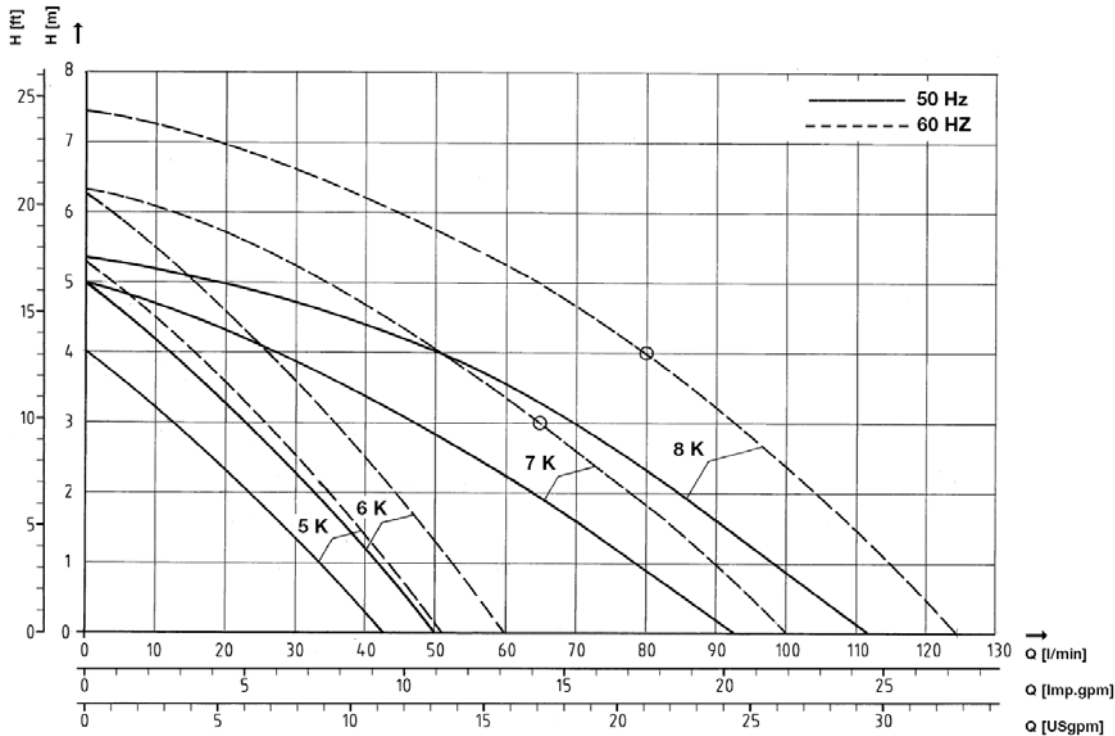
Three-phase operation							
Type		Rated power	Rated voltage	Rated frequency	Rated current	Rated speed	Noise level
		[kW]	$\Delta / Y$ [V]	[Hz]	$\Delta / Y$ [A]	[rpm]	[dB(A)]
<b>PRT</b> <b>PRA</b>	<b>12H</b>	0.37	230 / 400 255 / 440	50	1.73 / 1	2667	48
2-stage				60	1.49 / 0.86	3329	
<b>PRT</b> <b>PRA</b>	<b>17H</b>	0.37	230 / 400 255 / 440	50	1.73 / 1	2667	48
3-stage				60	1.49 / 0.86	3329	
<b>PRT</b> <b>PRA</b>	<b>22H</b>	0.75	230 / 400 255 / 440	50	2.72 / 1.57	2753	54
4-stage				60	2.37 / 1.37	3370	
<b>PRT</b> <b>PRA</b>	<b>27H</b>	0.75 0.9	230 / 400 255 / 440	50	3.46 / 2	2846	54
5-stage				60	3.46 / 2	3403	

Single-phase operation							
Type		Rated power	Rated voltage	Rated frequency	Rated current	Rated speed	BC
		[kW]	$\Delta / Y$ [V]	[Hz]	$\Delta / Y$ [A]	[rpm]	[ $\mu$ F]
<b>PRTE</b> <b>PRAE</b>	<b>12H</b>	0.35	230 255	50	1.8	2700	8
2-stage				60	2	3220	6
<b>PRTE</b> <b>PRAE</b>	<b>17H</b>	1) <sup>1)</sup>	1) <sup>1)</sup>	1) <sup>1)</sup>	1) <sup>1)</sup>	1) <sup>1)</sup>	1) <sup>1)</sup>
3-stage				1) <sup>1)</sup>	1) <sup>1)</sup>	1) <sup>1)</sup>	1) <sup>1)</sup>
<b>PRTE</b> <b>PRAE</b>	<b>22H</b>	0.55 0.75	230 255	50	3.45	2855	12
4-stage				60	3.97	3380	
<b>PRTE</b> <b>PRAE</b>	<b>27H</b>	1) <sup>1)</sup>	1) <sup>1)</sup>	1) <sup>1)</sup>	1) <sup>1)</sup>	1) <sup>1)</sup>	1) <sup>1)</sup>
5-stage				1) <sup>1)</sup>	1) <sup>1)</sup>	1) <sup>1)</sup>	1) <sup>1)</sup>

1)<sup>1)</sup>On request

**Characteristic curves**

Models PRT..K/PRA..K, 1-stage, for 50 and 60 Hz  
 Hz (without impeller change)



Data apply to media with viscosity of  $1 \text{ mm}^2/\text{s}$  at density of  $1 \text{ kg}/\text{dm}^3$ .  
 ○  $Q_{\text{max}}$  in single-phase operation (operation above  $Q_{\text{max}}$  leads to overload of the drive motor).

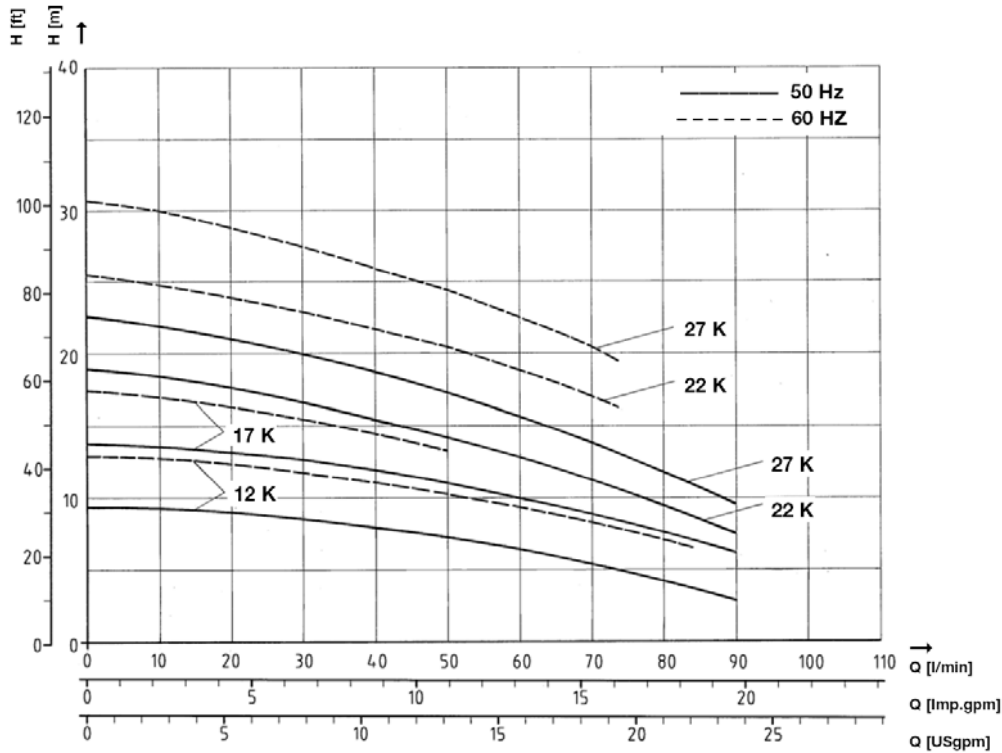
## Electrical values:

Three-phase operation							
Type		Rated power [kW]	Rated voltage $\Delta / Y$ [V]	Rated frequency [Hz]	Rated current $\Delta / Y$ [A]	Rated speed [rpm]	Noise level [dB(A)]
PRT PRA	5K	0.12	230 / 400 255 / 440	50 60	0.71 / 0.41 0.65 / 0.38	2886 3494	42
1-stage							
PRT PRA	6K	0.12	230 / 400 255 / 440	50 60	0.71 / 0.41 0.78 / 0.45	2886 3437	44
1-stage		0.18					
PRT PRA	7K	0.18	230 / 400 255 / 440	50 60	0.86 / 0.5 0.99 / 0.57	2812 3350	44
1-stage		0.25					
PRT PRA	8K	0.18	230 / 400 255 / 440	50 60	0.86 / 0.5 0.99 / 0.57	2812 3350	45
1-stage		0.25					

Single-phase operation							
Type		Rated power [kW]	Rated voltage $\Delta / Y$ [V]	Rated frequency [Hz]	Rated current $\Delta / Y$ [A]	Rated speed [rpm]	BC [μF]
PRTE PRAE	6K	0.12	230 255	50 60	1.12 1.1	2897 3486	6
1-stage		0.18					
PRTE PRAE	7K	0.18	230 255	50 60	1.36 1.1	2840 3486	6
1-stage							
PRTE PRAE	8K	0.18	230 255	50 60	1.36 1.1	2840 3486	6
1-stage							

**Characteristic curves**

Models PRT..K/PRA..K, 2- to 5-stage, for 50 and 60 Hz (without impeller change)



Data apply to media with viscosity of 1 mm<sup>2</sup>/s at density of 1 kg/dm<sup>3</sup>.

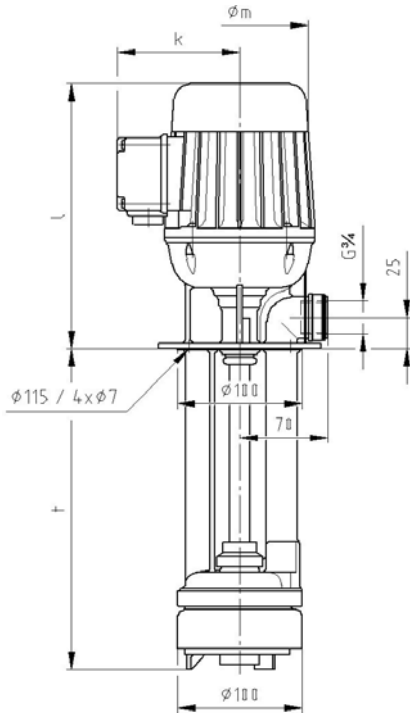
**Electrical values:**

Three-phase operation							
Type		Rated power	Rated voltage	Rated frequency	Rated current	Rated speed	Noise level
		[kW]	$\Delta / Y$ [V]	[Hz]	$\Delta / Y$ [A]	[rpm]	[dB(A)]
<b>PRT</b>	<b>12K</b>	0.37	230 / 400	50	1.73 / 1	2667	48
<b>PRA</b>				60	1.49 / 0.86	3329	
2-stage							
<b>PRT</b>	<b>17K</b>	0.37	230 / 400	50	1.73 / 1	2667	48
<b>PRA</b>				60	1.49 / 0.86	3329	
3-stage							
<b>PRT</b>	<b>22K</b>	0.75	230 / 400	50	2.72 / 1.57	2753	54
<b>PRA</b>				60	2.37 / 1.37	3370	
4-stage							
<b>PRT</b>	<b>27K</b>	0.75	230 / 400	50	3.46 / 2	2846	54
<b>PRA</b>		0.9		60	3.46 / 2	3403	
5-stage							

Single-phase operation							
Type		Rated power	Rated voltage	Rated frequency	Rated current	Rated speed	BC
		[kW]	$\Delta / Y$ [V]	[Hz]	$\Delta / Y$ [A]	[rpm]	[ $\mu$ F]
<b>PRTE</b>	<b>12K</b>	0.35	230	50	1.8	2700	8
<b>PRAE</b>				60	2	3220	6
2-stage							
<b>PRTE</b>	<b>17K</b>	1) <sup>1)</sup>	1) <sup>1)</sup>	1) <sup>1)</sup>	1) <sup>1)</sup>	1) <sup>1)</sup>	1) <sup>1)</sup>
<b>PRAE</b>				1) <sup>1)</sup>	1) <sup>1)</sup>	1) <sup>1)</sup>	1) <sup>1)</sup>
3-stage							
<b>PRTE</b>	<b>22K</b>	0.55	230	50	3.45	2855	12
<b>PRAE</b>		0.75		60	3.97	3380	
4-stage							
<b>PRTE</b>	<b>27K</b>	1) <sup>1)</sup>	1) <sup>1)</sup>	1) <sup>1)</sup>	1) <sup>1)</sup>	1) <sup>1)</sup>	1) <sup>1)</sup>
<b>PRAE</b>				1) <sup>1)</sup>	1) <sup>1)</sup>	1) <sup>1)</sup>	1) <sup>1)</sup>
5-stage							

1)<sup>1)</sup>On request

## Dimensions and weights:



Dimensions and weights for H and K designs						
Type		t [mm]	Weight [kg]	Ø m	k *	l
PRT PRA	5	90	3	120	98	190
		120				
		140				
		170				
		220				
1-stage unventilated		270	4			
PRT(E) PRA(E)	6 7 8	90	3.6	120	98	216
		120				
		140				
		170				
		220				
1-stage		270	4.2			
PRT(E) PRA(E)	12	130	4.5	120	98	216
		160				
		180				
		210				
		260				
2-stage		310	5			
PRT(E) PRA(E)	17	170	4.7	120	98	216
		200				
		220				
		250				
		300				
3-stage		350	5.2			
PRT(E) PRA(E)	22	200	6	140	104	295
		230				
		250				
		280				
		330				
4-stage		450	8			
PRT(E) PRA(E)	27	240	6.8	140	104	295
		270				
		290				
		320				
		320				
5-stage		450	8.5			

\*) Dimension "k" is increased by +20 mm on CSA and USA designs or when equipped with thermistor-type motor protection.

Standard ventilated motors come without a canopy.

If necessary – observe the respective safety regulations and laws applying to machinery protection – the motors can be supplied with a canopy at extra charge.

This increases dimension "l" by approx. 25 mm.

Immersion depth of 450 mm only on PRT22 and PRT27.

## 11.4 HCT...

### Design features

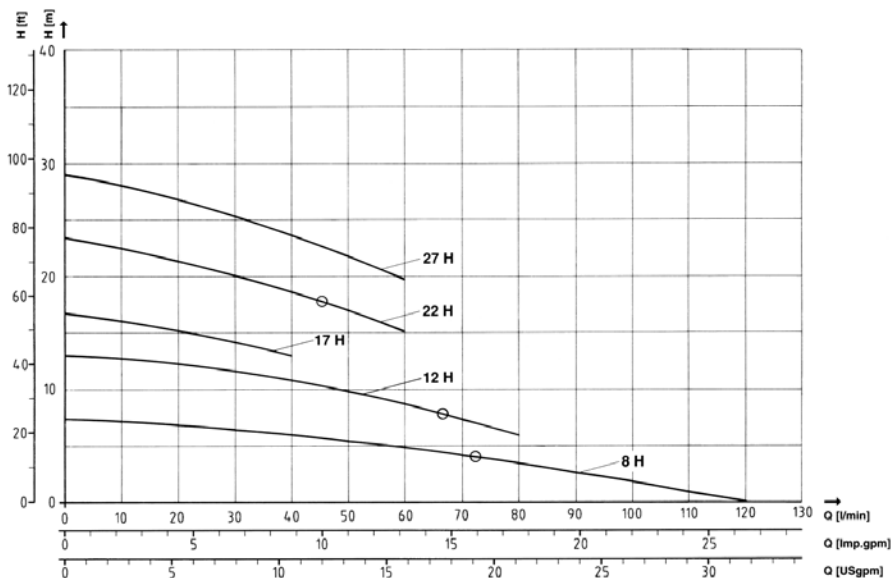
- Sealless
- Exposed pump shaft, mounted only in the motor
- Open impellers
- 1- to 5-stage designs
- Mounting dimensions as per DIN EN 12157
- Immersion depths to 450 mm
- 50 Hz and 60 Hz operation without impeller change
- Three-phase or single-phase drive

### Mechanical design

Component	Model PRT
Motor housing	Aluminum
Pump port	LCP
Pump bottom	LCP
Intermediate chamber	LCP
Impeller	LCP
Shaft	Stainless steel 1.4571
Rolling bearing	Deep groove ball bearings with 2 sealing rings (2RS), with special grease
Rotary shaft seal (below the rolling bearing)	FKM (FPM)
Splash ring (below the flange)	FKM (FPM)
Top splash ring (above pump chamber)	FKM (FPM)
V-ring (between fan and motor housing)	FKM (FPM)

### Characteristic curves

Model HCT..H, 1- to 5-stage, for 50 or 60 Hz  
(with impeller change)



Data apply to media with viscosity of  $1 \text{ mm}^2/\text{s}$  at density of  $1 \text{ kg}/\text{dm}^3$ .

○  $Q_{\text{max}}$  in single-phase operation (operation above  $Q_{\text{max}}$  leads to overload of the drive motor).



## Electrical values:

## Three-phase operation

Type	Rated power [kW]	Rated voltage $\Delta / Y$ [V]	Rated frequency [Hz]	Rated current $\Delta / Y$ [A]	Rated speed [rpm]	Noise level [dB(A)]
<b>HCT8H</b> 1-stage	0.25	230 / 400	50	1.11 / 0.64	2701	45
		255 / 440	60	0.99 / 0.57	3350	
<b>HCT12H</b> 2-stage	0.37	230 / 400	50	1.73 / 1	2667	48
		255 / 440	60	1.49 / 0.86	3329	
<b>HCT17H</b> 3-stage	0.37	230 / 400	50	1.73 / 1	2667	48
		255 / 440	60	1.49 / 0.86	3329	
<b>HCT22H</b> 4-stage	0.75	230 / 400	50	2.72 / 1.57	2753	54
		255 / 440	60	2.37 / 1.37	3370	
<b>HCT27H</b> 5-stage	0.75	230 / 400	50	3.46 / 2	2846	54
		255 / 440	60	3.46 / 2	3403	

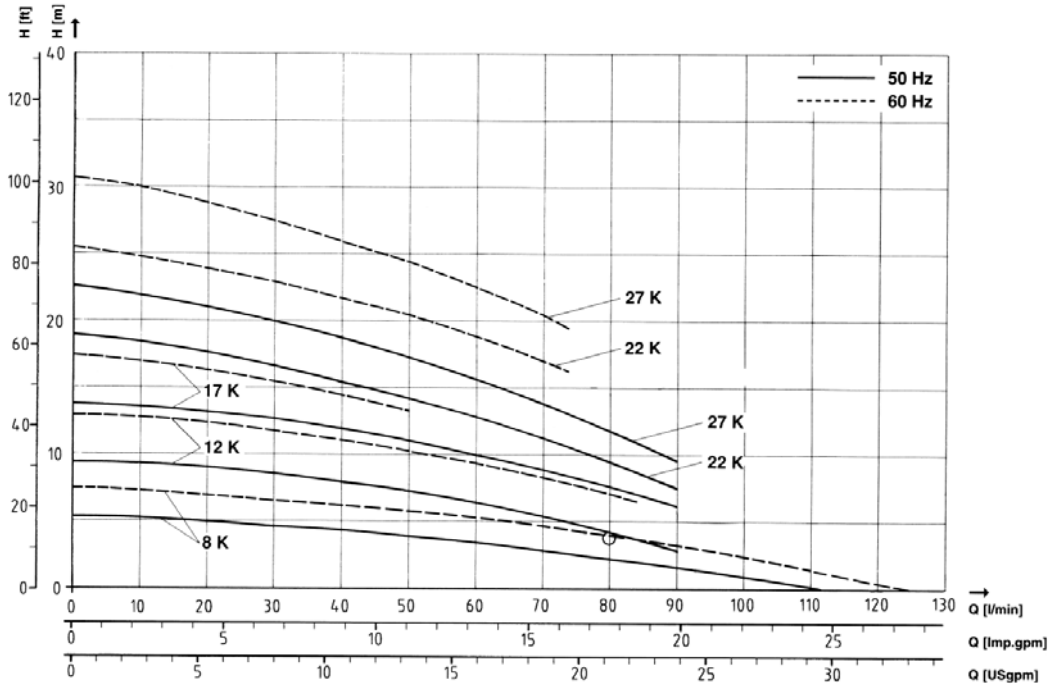
## Single-phase operation

Type	Rated power [kW]	Rated voltage $\Delta / Y$ [V]	Rated frequency [Hz]	Rated current $\Delta / Y$ [A]	Rated speed [rpm]	BC [ $\mu$ F]
<b>HCTE8H</b> 1-stage	0.18	230	50	1.36	2840	6
		255	60	1.1	3486	
<b>HCTE12H</b> 2-stage	0.35	230	50	1.8	2700	8
		255	60	2	3220	
<b>HCTE17H</b> 3-stage	1)	1)	1)	1)	1)	1)
<b>HCTE22H</b> 4-stage	0.55	230	50	3.45	2855	12
	0.75	255	60	3.97	3380	12
<b>HCTE27H</b> 5-stage	1)	1)	1)	1)	1)	1)

1)On request

**Characteristic curves**

Model HCT..K, 1- to 5-stage, for 50 and 60 Hz  
(without impeller change)



Data apply to media with viscosity of 1 mm<sup>2</sup>/s at density of 1 kg/dm<sup>3</sup>.  
 ○ Q<sub>max</sub> in single-phase operation (operation above Q<sub>max</sub> leads to overload of the drive motor).

## Electrical values:

## Three-phase operation

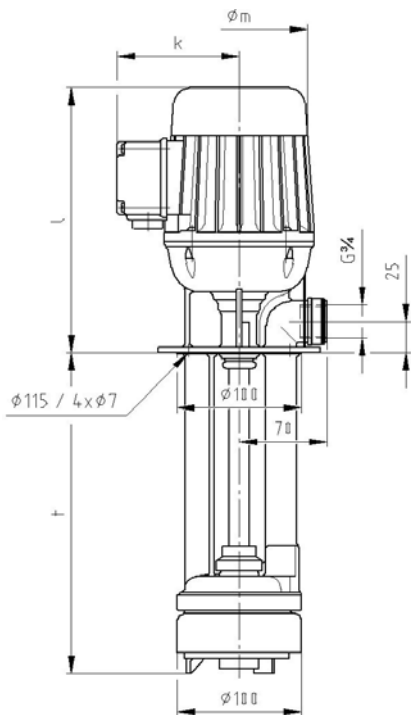
Type	Rated power [kW]	Rated voltage $\Delta / Y$ [V]	Rated frequency [Hz]	Rated current $\Delta / Y$ [A]	Rated speed [rpm]	Noise level [dB(A)]
<b>HCT8K</b>	0.18	230 / 400	50	0.86 / 0.5	2812	45
1-stage	0.25	255 / 440	60	0.99 / 0.57	3350	
<b>HCT12K</b>	0.37	230 / 400	50	1.73 / 1	2667	48
2-stage		255 / 440	60	1.49 / 0.86	3329	
<b>HCT17K</b>	0.37	230 / 400	50	1.73 / 1	2667	48
3-stage		255 / 440	60	1.49 / 0.86	3329	
<b>HCT22K</b>	0.75	230 / 400	50	2.72 / 1.57	2753	54
4-stage		255 / 440	60	2.37 / 1.37	3370	
<b>HCT27K</b>	0.75	230 / 400	50	3.46 / 2	2846	54
5-stage		255 / 440	60	3.46 / 2	3403	

## Single-phase operation

Type	Rated power [kW]	Rated voltage $\Delta / Y$ [V]	Rated frequency [Hz]	Rated current $\Delta / Y$ [A]	Rated speed [rpm]	BC [μF]
<b>HCTE8K</b>	0.18	230	50	1.36	2840	6
1-stage		255	60	1.1	3486	
<b>HCTE12K</b>	0.35	230	50	1.8	2700	8
2-stage		255	60	2	3220	6
<b>HCTE17K</b>	1 <sup>1)</sup>	1 <sup>1)</sup>	1 <sup>1)</sup>	1 <sup>1)</sup>	1 <sup>1)</sup>	1 <sup>1)</sup>
3-stage						
<b>HCTE22K</b>	0.55	230	50	3.45	2855	12
4-stage						
<b>HCTE27K</b>	1 <sup>1)</sup>	1 <sup>1)</sup>	1 <sup>1)</sup>	1 <sup>1)</sup>	1 <sup>1)</sup>	1 <sup>1)</sup>
5-stage						

<sup>1)</sup>On request

## Dimensions and weights:



Dimensions and weights for H and K designs					
Type	t [mm]	Weight [kg]	Ø m	k *)	l
<b>HCT(E)8</b> 1-stage	90	4.6	120	98	216
	120				
	140				
	170				
	220				
270	5.2				
<b>HCT(E)12</b> 2-stage	130	5.5	120	98	216
	160				
	180				
	210				
	260				
	310	6			
<b>HCT(E)17</b> 3-stage	170	5.7	120	98	216
	200				
	220				
	250				
	300				
	350	6.2			
<b>HCT(E)22</b> 4-stage	200	7	140	104	295
	230				
	250				
	280				
	330	9			
<b>HCT(E)27</b> 5-stage	240	7.8	140	104	295
	270				
	290				
	320	9.5			

\*) Dimension "k" is increased by +20 mm on CSA and USA designs or when equipped with thermistor-type motor protection.

Standard ventilated motors come without a canopy.

If necessary -- observe the respective safety regulations and laws applying to machinery protection -- the motors can be supplied with a canopy at extra charge.

This increases dimension "l" by approx. 25 mm.

## 11.5 PRK...

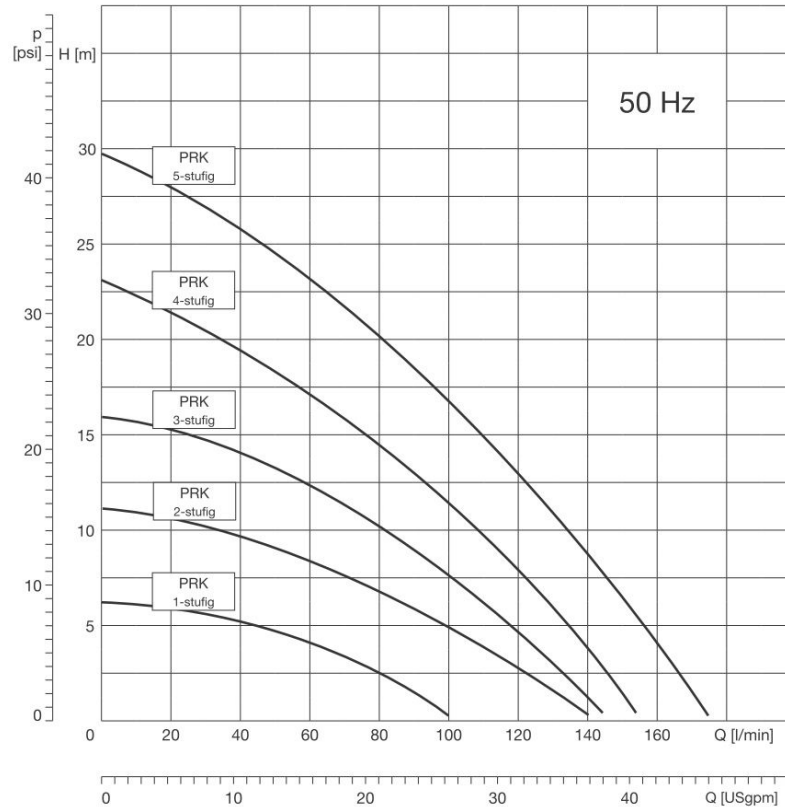
## Design features

- Sealless
- Open impellers
- 1- to 5-stage designs
- Mounting dimensions as per DIN EN 12157
- Immersion depths to 410 mm
- 50 Hz and 60 Hz operation possible

## Mechanical design

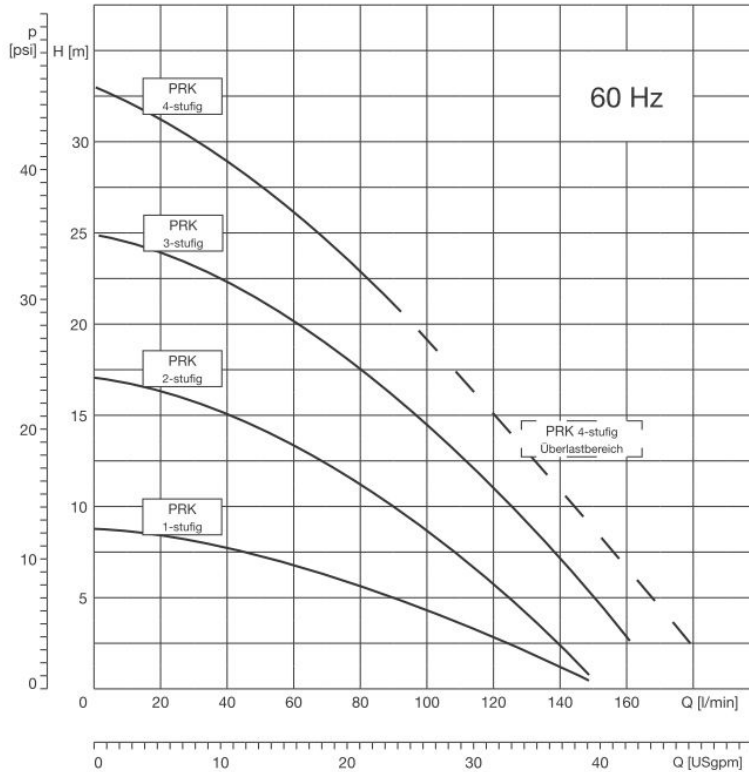
Component	Material
Motor housing	Aluminum
Pump port	POM
Base	PPS
Pump shaft	1.4057
Impeller	POM
Guide vane	PP
Intermediate chamber	PPS
Rolling bearing	Deep groove ball bearings with 2 shields (Z)
Pump bottom	PP
Elastomers	FKM (FPM), NBR
Pipe extension	PP
Screen filter	1.4301

## Characteristic curves for 50 Hz



Data apply to media with viscosity of 1 mm<sup>2</sup>/s at density of 1 kg/dm<sup>3</sup>.

Characteristic curves for 60 Hz



Data apply to media with viscosity of 1 mm<sup>2</sup>/s at density of 1 kg/dm<sup>3</sup>.

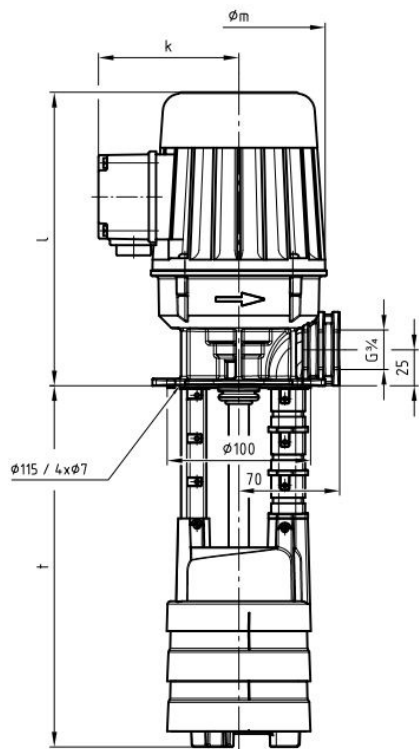
**Electrical values at 50 Hz:**

Type	Rated power [kW]	Rated voltage $\Delta/Y$ [V]	Rated current $\Delta/Y$ [A]	Rated speed [rpm]	Noise level [dB(A)]
PRK 1-stage	0.25	230/400	1.11/0.64	2701	45
PRK 2-stage	0.37	230/400	1.72/1.00	2667	48
PRK 3-stage	0.55	230/400	2.06/1.19	2836	52
PRK 4-stage	0.75	230/400	2.56/1.48	2870	54
PRK 5-stage	1.1	230/400	4.07/2.35	2730	58

**Electrical values at 60 Hz**

Type	Rated power [kW]	Rated voltage $\Delta/Y$ [V]	Rated current $\Delta/Y$ [A]	Rated speed [rpm]	Noise level [dB(A)]
PRK 1-stage	0.42	265/460	1.72/1.00	3329	48
PRK 2-stage	0.62	265/460	2.06/1.19	3446	52
PRK 3-stage	0.86	265/460	2.56/1.48	3410	54
PRK 4-stage	1.26	265/460	4.07/2.35	3368	58

## Dimensions and weights



## Values for 50 Hz

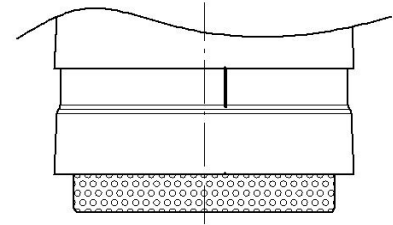
Type	Immersion depth t [mm]	Weight [kg]	$\phi_m$	k	l
PRK 1-stage	90	4.0	122	99	204
	120	...			
	150	...			
	180	...			
	210	...			
	240	...			
270	4.4				
PRK 2-stage	125	4.2	122	99	204
	155	...			
	185	...			
	215	...			
	245	...			
	275	...			
305	4.6				
PRK 3-stage	160	4.4	122	99	204
	190	...			
	220	...			
	250	...			
	280	...			
	310	...			
340	4.8				
PRK 4-stage	195	8.1	140	114	283
	225	...			
	255	...			
	285	...			
	315	...			
	345	...			
375	8.5				
PRK 5-stage	230	8.3	140	114	283
	260	...			
	290	...			
	320	...			
	350	...			
	380	...			
410	8.7				



## Values for 60 Hz

Type	Immersion depth t [mm]	Weight [kg]	$\varnothing_m$	k	l
PRK 1-stage	90	4.0	122	99	204
	120	...			
	150	...			
	180	...			
	210	...			
	240	...			
270	4.4				
PRK 2-stage	125	4.2	122	99	204
	155	...			
	185	...			
	215	...			
	245	...			
	275	...			
305	4.6				
PRK 3-stage	160	7.9	140	114	283
	190	...			
	220	...			
	250	...			
	280	...			
	310	...			
340	8.3				
PRK 4-stage	195	8.1	140	114	283
	225	...			
	255	...			
	285	...			
	315	...			
	345	...			
375	8.5				

## Design with screen filter



## 11. Technical data

## 11.6 Electrical design

The drive motors meet VDE regulations and European motor standards (DIN EN 60034-1), as well as the requirements for the CE mark.

Designs are possible that conform to non-European regulations, e.g. **CSA**, **UL** or special requirements, e.g. for the USA or Japan.

-Material	High-impact Plastic	Light alloy
-Cable entry (DIN EN 50262)	M16x1.5	M25x1.5
Surface protection	<b>PRA.../PRT.../PRG.../PRK...</b> Synthetic-resin varnish, RAL 9005 <b>HCT</b> Synthetic-resin varnish, RAL 1013	Industrial plug connector Special finishes on request
Special protection		Integrated thermistor-type motor protection, fan cowl with canopy
Use with converter		On request

	<b>Standard</b>	<b>Option</b>
Protection class (DIN EN 60034-5)	IP54 <b>PRK</b> IP55	IP55
Insulation class	F.B	F
Ambient temperature (DIN EN 60034-1)	Max. 40°C	50°C and higher
Relative humidity (DIN 50015)	Max. 92%	95% and higher
Site altitude (DIN EN 60034-1)	< 1000 m above sea level NN	On request
Power supply (Standard)	230/400 V, 50 Hz 265/460 V, 60 Hz	On request
Mains operation	Three-phase	Single-phase AC
Number of poles	2-pin	4-pin, pole-changing
Terminal box -Layout (DIN EN 12157)	Layout 1	Layout 2, 3, or 4





**Order number: 951-170-024**

**Subject to change without notice.**

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